R^{11}, R^{12} and R^{13} are each independently selected from the group consisting of H, halogen, C_1-C_{20} alkyl, C_3-C_8 cycloalkyl, $C(=Y)R^5$, $C(=Y)NR^6R^7$, COCl, OH, CN, C_2-C_{20} alkenyl, C_2-C_{20} alkynyl oxiranyl, glycidyl, aryl, heterocyclyl, aralkyl, aralkenyl, C_1-C_6 alkyl in which from 1 to all of the hydrogen atoms are replaced with halogen and C_1-C_6 alkyl substituted with from 1 to 3 substituents selected from the group consisting of C_1-C_4 alkoxy, aryl, heterocyclyl, $C(=Y)R^5$, $C(=Y)NR^6R^7$, oxiranyl and glycidyl;

where R^5 is alkyl of from 1 to 20 carbon atoms, alkoxy of from 1 to 20 carbon atoms, aryloxy or heterocyclyloxy; and R^6 and R^7 are independently H or alkyl of from 1 to 20 carbon atoms, or R^6 and R^7 may be joined together to form an alkylene group of from 2 to 5 carbon atoms, thus forming a 3- to 6-membered ring; such that no more than two of R^{11}, R^{12} and R^{13} are H.

REMARKS

Claims ~~70, 71, 74~~ and 81-124 are pending in the subject application. In the Office Action, claims ~~70, 71, 74~~ and 117-124 are rejected under 35 U.S.C. § 112, first paragraph, 35 U.S.C. § 112, second paragraph and 35 U.S.C. § 102(b) as anticipated by or in the alternative under 35 U.S.C. § 103(a) as obvious over U. S. Patent No. 4,007,165 issued to MacLeay et al. ("MacLeay"). Claims 70, 71 and 74 are herein cancelled. The Examiner has also objected to the Abstract of the Disclosure.

Claim Rejections - 35 U.S.C. § 112, first paragraph

In the Office Action, claims 70, 71, 74 and 117-124 were rejected under 35 U.S.C. § 112, first paragraph, as containing subject matter which was not described in the specification in such a way as to enable one skilled in the art to which it pertains, or with which it is most nearly connected, to make or use the invention. In the Examiner's opinion, the claims are not commensurate in scope with the enabling disclosure because the claims are excessively broad since they use functional language to describe what the initiators are capable of doing rather that what functional groups they contain. Applicants herein cancel claims 70, 71, and 74.

Applicants respectfully disagree.

Claims are not necessarily considered excessively broad because they use functional language to describe what the initiators are capable of doing. The Manual for Patent Examining Procedure ("MPEP") states clearly a "functional limitation is **often** used in association with an element, ingredient, or step of a process to define a particular **capability** or purpose that is served by the recited element, ingredient or step." MPEP § 2173.05(g) (Emphasis added.). The MPEP provides:

> A functional limitation is an attempt to define something by what it does, rather than what it is (e.g., as evidenced by its specific structure or specific ingredients). The is nothing inherently wrong with defining some part of an invention in functional terms. Functional language does not, in and of itself render a claim improper. *Id.*

Claim 117 of the subject application reads as follows:

> 117. A multifunctional polymerization initiator compound, comprising:
>
> at least one radically transferable atom or group capable of initiating an atom transfer radical polymerization; and
>
> at least one initiation group capable of initiating at least one of a cationic, an anionic, a peroxide initiated free radical, a controlled free radical, metathesis, ring opening and coordination polymerization process.

The Examiner has rejected this claim, and other claims, for containing the phrase "capable of" in a element. As shown above, the MPEP instructs that functional limitations may be used to define a "particular capability" of an element as done in the claims of the subject application. The standard to be used for examination of a functional limitation is provided in the same section of the MPEP, § 2173.05(g), as follows:

> A functional limitation must be evaluated and considered, just like any other limitation of the claims, for what it fairly conveys to a person of ordinary skill in the pertinent art in the context in which it is being used. A functional limitation is often used in association with an element, ingredient, or step of a process to define a particular capability or purpose that is served by the recited element or ingredient or step. *Id.*

The elements and limitations of the claims of the subject application should be evaluated and considered for what they fairly convey to a person of ordinary skill in the pertinent art. The first functional limitation to be considered and evaluated is the phrase "at least one radically transferable atom or group capable of initiating an atom transfer radical polymerization" for what it fairly conveys to one skilled in the pertinent art. Earlier articles and patent applications which are incorporated by reference into the subject application describe in detail a radically transferable atom or group capable of initiating an ATRP process. Particularly, U.S. Patent Applications 08/414,415 (now U. S. Patent No. 5,763,548 (hereinafter "'548")) and 08/559,309 (now U. S. Patent No. 5,807,937(hereinafter "'937")) define in detail radically transferable atom or groups for interpretation of the claims of the subject application. Particularly in '548, the description of radically transferable atoms or groups is in column 8, line 50 to column 9, line 33 and in '937, radically transferable atoms or groups are described from column 17, line 4 to column 18, line 55, as well as elsewhere in each of the specifications. It is also described in the applications, that the radically transferable atom or group is similar to the radically transferable atom or group in the conventional atom transfer radical addition reaction. Atom transfer radically addition reactions are well known and described in the art. (For a discussion of the similarity of ATRA and ATRP, see '548 in the Background of the Invention and, for a further discussion in the Description of the Invention, see column 24, line 28 to column 25, line 9, for example. To be fair, it should be determined one skilled in the art would clearly understand the

metes and bounds of the functional limitation "radically transferable atom or group capable of initiating an atom transfer radical polymerization" in the claim.

Claim 117 also includes the limitation that the multifunctional polymerization initiator compound comprises at least one initiation group capable of initiating at least one of a cationic, an anionic, a peroxide initiated free radical, a controlled free radical, metathesis, ring opening and coordination polymerization process. One skilled in the art understands initiation of these well known polymerization processes and these limitations do not need to be further described. In fact, the MPEP provides that "not everything necessary to practice the invention need be disclosed. In fact, what is well-known is best omitted." See MPEP § 2164.08. Each of the polymerization processes included as limitations in the claim are well described and known in the art. In addition, the specification gives specific examples of these initiation groups.

The functional limitations of the claims of the subject application fairly convey to one skilled in the art the metes and bounds of the claimed invention. The specification additionally describes how to use the initiator on page 31, lines 19-26 and how to prepare a dual functional initiator is described in Example 270, the dual functional initiator is used to prepare polystyrene macroinitiator by conducting a free radical polymerization in Example 271 and Example 272 further teaches how to use the macroinitiator to conduct an ATRP adding monomers to the macroinitiator of claim 271. Additionally, example 275 teaches the use of a macroinitiator prepared by ionic ring opening polymerization in an ATRP process. Other examples also teach additional aspects of the subject matter if the claims of the subject application. The advantage of using dual functional initiators for the formation of copolymers is that the there are no intermediate steps between the polymerization process that requires functionalization of the macroinitiator to form an initiation site for the second polymerization process. Since ATRP and the non-ATRP polymerization processes are well known in art, further description of there use is not needed to fulfill the enablement requirement. As stated above, "not everything necessary to practice the invention need be disclosed. In fact, what is

well-known is best omitted." *Id.* Therefore, the claims are not excessively broad based on the disclosure. Reconsideration of the 35 U.S.C. § 112, first paragraph rejection is respectfully requested.

The Examiner states that the claims of the subject application are omnibus. The MPEP defines an omnibus claim as one "which uses the reads as follows: A device substantially as shown and described." See MPEP § 2173.05(r). This rejection is not understood by the Applicant. Nowhere in the MPEP can it be found that functional language renders the claim omnibus.

Claim Rejections - 35 U.S.C. § 112, second paragraph

In the Office Action, claims 117-124 were also rejected under 35 U.S.C. § 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which Applicants regard as the invention. Examiner states that claims 117-124 fail to define the metes and bounds of the invention because they still recite the invention functional language. The argument presented above in response to the 35 U.S.C. §112, first paragraph rejection, addresses this issue. In summary, functional limitations are not inherently improper and must be interpreted in light of what it fairly conveys to one skilled in the pertinent art.

The Examiner further states that the Applicants point to the specification for guidance as to what the groups may be, and, states that it is impermissible to import limitations from the specification into the claims. Applicants disagree that the arguments of the previous response to the Office Action attempts to import limitations from the specification into the claims. The limitations are in the claims. However, "limitations . . . are to be interpreted in light of the specification in giving them their broadest reasonable interpretation." MPEP § 2111.01. Applicants have merely pointed to the specification to assist the Examiner in interpreting the metes and bounds of the claims of the subject application as would one skilled in the pertinent

art be expected to do. Applicants respectfully submit that all limitations are included in the claims of the subject application, but these claims must be interpreted in light of the specification.

Claim Rejections - 35 U.S.C. § 102

In the Office Action, claims 117-124 were rejected under 35 U.S.C. § 102 as being anticipated by MacLeay. The Examiner explains the MacLeay discloses a series of chlorinated azo initiators for olefin polymerization, specifically citing columns 43 and 44, Table I, Examples XXIX-XXXIV, lines 3-21 and column 56, Example LXXVII, lines 36-38. The Examiner states that the azo moiety can initiate a non-ATRP, free radical polymerization, and the chloride moiety can initiate an ATRP polymerization much like the elected species of the Applicants.

The claims as presented are not anticipated by MacLeay. The subject matter of the new claims 117 and 118 describe a multifunctional initiator compound comprising at least one radically transferable atom or group capable of initiating an atom transfer radical polymerization; and at least one initiation group capable of initiating at least one of a cationic, an anionic, a peroxide initiated free radical, a controlled free radical, metathesis, ring opening and coordination polymerization process. As stated above, the initiators of MacLeay are not capable of initializing any of the claimed polymerization processes. The compounds of Macleay are limited to azo containing compounds. The compounds of the present claims do not include azo initiated free radical polymerizations and therefore are not anticipated by the compounds of MacLeay. MacLeay solves the problem of toxicity and handling of azo containing compounds in general and specifically of 2,2'-azobisisobutyronitrile.

Applicants respectfully submit that since the disclosure of MacLeay does not anticipate independent claim 117, dependent claim 118 is also not anticipated by this disclosure. Applicants also respectfully submit that there is no motivation provided in MacLeay or from the knowledge of one skilled in the art to modify the disclosed compounds to provide a

the claimed multifunctional initiator compounds, especially considering that ATRP was not a known polymerization process at the time of filing of MacLeay, March 21, 1974. Additionally, claims 118-122 are directed toward macroinitiators comprising at least one polymer block. MacLeay does not disclose a macroinitiator or suggest or motivate one skilled in the art to prepare a macronitiator comprising at least one polymerization initiation group.

Clearly, the macroinitiators of claims 119-124 of the subject application are not anticipated by the disclosure of MacLeay. None of the compounds of MacLeay include a polymeric segment. There is no motivation to modify the compound of MacLeay to include these limitations.

Certain basic considerations apply to obviousness rejections. The Manual of Patent Examining Procedures ("MPEP") describes the following tenets of patent law which must be adhered to:

(A) The claimed invention must be considered as a whole;

(B) The references must be considered as a whole and must suggest the desirability and thus the obviousness of making the combination;

(C) The references must be viewed without the benefit of impermissible hindsight vision afforded by the claimed invention and

(D) Reasonable expectation of success is the standard with which obviousness is determined. *MPEP §2141*, citing *Hodosh v. Block Drug., Inc.*, 786 F.2d 1136, 1143 n.5, 229 U.S.P.Q 182, 187 n.5 (Fed. Cir. 1986).

MacLeay does not provide any suggestion of the desirability of producing a macroinitiator for the preparation of block copolymers comprising at least one initiation site. Specifically, the desirability of a multifunctional polymerization initiator is not suggested, especially, not the desirability of a multifunctional polymerization initiator comprising an ATRP initiation site. MacLeay solves the problem of toxicity and handling of azo containing

compounds in general and specifically of 2,2'-azobisisobutyronitrile. No motivation is found in MacLeay to modify the compounds of MacLeay to form the compounds of the claims of the subject application. There is no motivation in MacLeay for the desirability of have a single compound having initiation sites for at least two different polymerization processes. The advantages are that the different processes allow preparation of polymer segments with different properties. These novel compounds allow formation of novel polymers with novel properties, such as block and graft copolymers. This is not contemplated by MacLeay. Therefore, Applicants respectfully submit that new claims 117-124 are not obvious based upon MacLeay or any reference of record in the subject application. Additionally, the compounds of MacLeay are not macromolecules and there is no motivation or suggestion to modify the compounds to form the macroinitiators of the claims of the subject application.

Abstract of the Disclosure

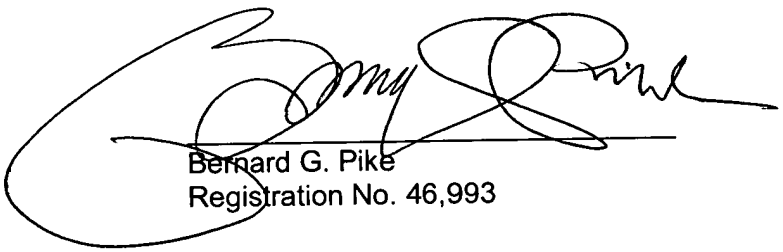
Applicants have herein amended the Abstract of the Disclosure to comply with the requirements of the Examiner. The Examiner rejected the Abstract because it speaks in functional language. Applicants have amended the Abstract to comply with MPEP §608.01(b) but did not remove all of the functional language because the functional language is the best means to provide a concise statement of the technical disclosure of the patent and to include what is new in the art.

A copy of the Abstract of the Disclosure is provided on an separate sheet for the convenience of the Examiner.

CONCLUSION

Applicants fully address each basis for rejection under § 112, §102 and §103. Consideration of the new claims of the subject application is respectfully requested. Applicants submit that the new claims are in condition for allowance. Applicant requests such action at an early date. Should the Examiner have any remaining concerns, he is requested to contact the undersigned at the telephone number below so that those concerns may be addressed without the necessity for issuing an additional Office Action.

Respectfully submitted,



Bernard G. Pike
Registration No. 46,993

Kirkpatrick & Lockhart LLP
Henry W. Oliver Building
535 Smithfield Street
Pittsburgh, PA 15222-2312
Phone: (412) 355-8620
Fax: (412) 355-6501

COPY OF ABSTRACT AND CLAIMS INDICATING AMENDMENTS MADE HEREIN

In the Abstract of the Disclosure

"ABSTRACT OF THE DISCLOSURE

The present invention relates to ~~polymerization initiators. Embodiments of the present invention comprise~~ multifunctional polymerization initiators comprising ~~at least one site that may initiate an atom or group transfer radical polymerization ("ATRP")~~a radically polymerizable atom or group and at least one ~~site that may initiate a~~ non-ATRP polymerization ~~process~~initiation group. The non-ATRP polymerization process may be any one of a cationic, anionic, free radical, controlled free radical, metathesis, ring opening and coordination polymerization process. An example is a halogenated peroxide derivative for conventional free radical polymerization and ATRP. ~~Either of the polymerization processes may be conducted first as long as the other initiation site remains intact after the first polymerization process.~~

Embodiments of the present invention comprise macroinitiators which initiate polymerization processes to produce block copolymers. The block copolymers may comprise monomer units polymerizable by different polymerization processes, including but not limited to, cationic, anionic, free radical, controlled free radical, metathesis, ring opening and coordination polymerization processes."

In the Claims

119. (Amended) A macroinitiator for polymerization processes, comprising:

a free radical polymerization initiator group comprises at least one of an azo group and a peroxy group;

at least two polymer blocks each comprising ~~monomeric units derived from~~ alkyl methacrylate ~~monomers~~ monomeric units attached to the convention free radical polymerization initiator group.